# COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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## Computer Makes Another 'Hit'

**Kansas City police recreate an arrest aided by the department's new Alert computer system. The helicopter radioed for a computer check on tha license number of a car being drivan in an erratic manner. Within seconds, the computer alerted police that the owner was wantad. The halicopter kept tha car in sight until a patrol car could catch up with it and maka the arrest. Story on page 8.**

# NLRB Stops Union Bid for EDP Staff

By Leete Doty

LACKAWANNA, N.Y. – An attempt to have computer programmers and systems analysts included under the terms of a labor union contract against their wishes has gone down to defeat.

The data processing personnel were reported to be quite upset over the union attempt, and were reported to have submitted a petition to the National Labor Relations Board in an effort to stop the unionization.

The United Steel Workers of America, AFL-CIO, had asked the NLRB to rule that the 18 programmers and systems analyats at the Bethlehem Steel Corp. plant here were clerical workers and should therefore be included in the union's clerical unit.

However, the NLRB, in an eight page decision, concluded that, because of job functions, the data processing personnel could not be regarded as an accretion to the existing clerical unit.

The section where the data processing personnel work, is a union shop area. Had the union won, the DP personnel would have been forced either to join the union or to quit their jobs.

An NLRB spokesman explained that only two methods other than appeal would have been open to the programmers to get out of the union. The first method – one not considered likely to succeed – would involve having the entire unit into which the EDP personnel were accreted vote to withdraw from the union.

The second method would have involved successfully arguing before the proper bodies that as skilled personnel, they were entitled to a special bargaining unit composed of just themselves or in which they comprised a majority. They could then vote not to be represented by a union.

The NLRB spokesman explained that while it may not seem democratic that the programmers and systems analysts could be made to join the union against their wishes, the fact is that at one time, by a democratic method, it had been determined that all people working in the section in jobs covered by the union contract would be members of the union.

### NLRB Decision

The June 26 NLRB decision and order shows that the union, to support its request to clarify the certification to include the EDP personnel, asserted that: (1) EDP personnel are clerical employees who have a community of interest with other salaried unit clerical personnel, and that (2) assuming that the EDP personnel are technical employees, they perform duties similar to those performed by bargaining unit employees.

The decision stated that the evidence showed that from the time the first EDP equipment was installed in 1960 until the EDP department was reorganized in October 1966, the company periodically informed the union that the employees in question were classified as "exempt, non-bargaining unit employees," and that the union neither protested the exclusion of these employees from the bargaining unit nor claimed to represent them from 1960 until the fall of 1966.

*(Continued on Page 16)*

# I/O Committee Seeks Full Status

NEW YORK – An ad hoc committee on input/output interfaces was rebuffed in its attempt to become a permanent subcommittee at a U.S.A. Standard Committee X3 meeting here recently. The decision was taken on the grounds that a firm statement of objective purpose was still needed. G.E. Poorte, I/O Interface Committee chairman, told *Computerworld* he was still pressing for full subcommittee status.

The committee, which has been functioning for the past three years, recently decided to concentrate its attention on the interface between the central processor and the control electronics. The committee will aim for three separate standards in this area, dealing with the logical, electrical and physical operations. Consideration is being given to interfaces of different speeds, but the initial effort will permit the interconnection of control electronics for higher speeds, while the problem of lower speed interfaces will be temporarily deferred.

### Alternatives Considered

The selection of an interface to be between the processor and the controller was a debated decision after several possible interfaces were considered. In particular, the interface between the controller and the peripheral was considered, but in view of the number of different types of peripherals which exist and the magnitude of the task involved in defining what might turn out to be potentially different standards for different devices, this was not followed up.

Poorte later told *Computerworld* that the amount of work to be done was substantial and that he did not anticipate its completion in less than two years at the earliest. In general, he did not anticipate the effects of the standard, he said, coming into use until the fifth, rather than the fourth, generation.

The advantages to the user would be a wider choice of competitive peripherals and increased freedom to reuse or reassign units of equipment. It was realized that argumenta regarding malfunctions and maintenance might reduce the value of this choice. Emphasis was placed on the fact that the compatibility for mechanical and electrical processes did not involve program or software interchangeability.

### Specification Problem

An idea of the comprehensiveness of a standard was given in a committee introduction to a report on I/O interface parameters which require specification. The committee felt that the parameters of an I/O interface which must be defined and/or specified fall into four main categories. These categories are Mechanical,

*(Continued on Page 16)*

# *Nationwide Hotel Reservations System Planned for Fall Start*

ORLANDO, Fla. – The first segments of a nationwide, across the board hotel-motel reservation service, the National Accommodations Reservations Service, Inc., (Nars) is scheduled to begin operating in September.

The full system is expected to be operational in April, the company said.

In addition, the network is scheduled to provide credit validation, reporting, and accounting programs to subscribing hotels and motels.

Under the system, an individual will be able to telephone, from his home or office, one of the 125 Nars centers to be scattered across the nation and to make reservations, without cost, in any hotel or motel that subscribes to the service.

### Reservations Anywhere

Howard D. Corbett, Nars director of systems, said the company hopes that all of the nation's approximately 70,000 hotels and motels eventually will be connected to the network.

J. Pendleton Gaines, Nars president, said that currently only about 2% of the nation's hotels and motels are served by computerized reservations systems now, and that only about 9% of the industry is served by reservations systems of any type.

### Supplementary System

Gaines added that the new computerized network will not be in competition with existing hotel and motel chain and referral services, but will supplement them through interfacing with existing systems.

Corbett said that those without computerized reservationa systema could use the Nars system as their own. Each establishment would have complete control over its own space.

*(Continued on Page 3)*

## *Holy Computers!*

**NEW YORK – "Computer" is an "in" word these days, a fact that laads to some pretty strange uses – and abuses.**

**Tha June issue of *My Secret Life*, a confession magazine, carried a story entitled "Ha Used His Computer to [illegible] e Ma," a story that concerns [illegible] ier rape nor data processing, [illegible] a high school girl's temptation [illegible] a fast boy.**

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## EDP Antipoverty School Closes

**NEW YORK – The Mid-West Side Data Processing School at 569 Amsterdam Ave., an antipoverty training program, has not received the funds it needed [CW, Aug. 14] and has been forced to discontinue its keypunch and console classes. The programming class, slightly more than half way through a nine week curriculum, will continue, however.**

**The school is sponsored by the Puerto Rican-Hispanic Association for Social Action, Inc., and the New York City chapter of the Association for Computing Machinery.**

### $6000 Needed

**Leo Barnett, the school's director, said that $6000 would pay the school's back bills and pay for the remainder of the programming course. The school's three teachers have not been paid for two and a half weeks, he said.**

**So far, the school has received promises, but no money, he said.**

**The school had applied for and was approved for antipoverty funding, but at the last minute, the funding was not available, he said.**

### Most Graduates Placed

**Barnett said that all of the eight keypunch and seven of the nine console operator graduates had been successfully placed. Equitable Life Assurance Society, which hired three of each, reported that they were better than personnel hired through other channels, he said.**

## Skinner Says Computers Are Not Good Teachers

CAMBRIDGE, Mass. – E.F. Skinner, the patron saint of programmed instruction, has gone on record to say that computers are just a fad as teaching devices. Discussing the programmed instruction training with *Forbes* interviewers, he said that "setting up a computer to teach children is just idiotic" and that a "simple programmed workbook will do what the computer can do at one-tenth the cost."

His primary objection was with the lack of a good software technique for handling the educational needs. "The computer still forces you into the multiple choice format," he said. "That is a great mistake."

By contrast, he admitted that the operation of computers as a means for storing information, such as a library, or alternatively for bringing forth some audio-visual materials as part of a school curriculum, was practical. But he restricted his comments to teaching devices.

## Sen. Long Blames Defeat On Wiretappers, Snoopers

ST. LOUIS, Mo. – Sen. Edward V. Long, long-time foe of wire tapping and other government invasions of privacy, lost his bid for renomination in the Democratic primary last week. He termed his defeat "a great victory for the wiretappers, snoopers, and federal bureaucrats who violate the constitutional rights of our citizens."

Long and Rep. Cornelius E. Gallagher D-N.J., another defender of privacy, have been under attack by *Life* magazine in the last year. Long has been accused by *Life* of using his office to help Teamster Union President James R. Hoffa. Gallagher has been accused by *Life* of dealing with a reputed Mafia boss.

Both have denied any wrongdoing.

Long's defeat came Aug. 6, one day after *Life's* most recent story on Gallagher [CW, Aug. 14] appeared on the newsstands. The story mentioned Long only incidentally.

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## IFIP '68 Judged Successful; Delegates Warned on Jargon

EDINBURGH, Scotland – The more than 4500 registrants at the trienniel International Federation for Information Processing (IFIP) Congress here were treated to six days of favorable weather, an abundant diet of 250 technical papers, and several panel discussions, and an exhibition including a $6 million display of time sharing systems and data preparation equipment and the first public demonstration of the capabilities of Britain's recently formed computer conglomerate, International Computers Ltd. (ICL).

The exhibition, held in the shadow of Castle Rock upon which the city's historic Edinburgh Castle resides in medieval splendor, afforded the visitor from the U.S. an impressive view of the surprisingly advanced state of data communications and computer time sharing technology in Britain. The Post Office, the government run organization which provides telephone services in Britain, showed an impressive display of data communications modem units and appropriate channel capacities. Major computer based data communications systems were described or exhibited by Britain's National Coal Board, the National Computing Center, the Central Electricity Generating Board, as well as by the computer systems manufacturers themselves such as IBM, Honeywell, ICL, Digital Equipment, General Electric, and Hewlett-Packard.

### Technical Sessions

The technical sessions were held in seven different lecture halls located at various points through the city, insuring the conference attendees an opportunity to view Edinburgh's many attractive buildings, churches, castles, squares, etc. U.S. visitors at the conference interviewed by *Computerworld* were generally well pleased with the arrangements, although some complaints were registered about the shortage of hotel space and the considerable geographic distances between the concurrent technical sessions, making it practically impossible to "session-hop."

### Keynote Speaker

The keynote speaker, Earl Mountbatten of Burma, warned the delegates to beware of the "danger of inventing a complicated new language." He warned: "We should be aiming to express ourselves more simply and thereby achieve one of the purposes of this Congress – to communicate with each other in clearly understandable terms." He cited, as an example of professional jargon which mystifies the public and frightens away capable young people which the field would do well to attract, the title of one of the session papers: "Partial Isomorphism in Graphs and Structural Similarities in Tree-Like Organic Modules."

Earl Mountbatten also noted that "as information processing becomes more widely understood at all levels – and I include management – so will the demand increase for new types of hardware." However, talking like an experienced user of third generation computers, he emphasized that this expansion will require reliable low cost equipment and struck the point that "it may be that we are striving too often in this field to achieve sophisticated performance at consequently high costs when something much less sophisticated and elaborate and thereby much less expensive would serve just as well."

## Price of Core Memory Cut 30%

**Micromemory 1000**

HAWTHORNE, Calif. – The price of the Micromemory 1000 core memory system has been cut 30% by Electronic Memories, Inc.

The cut from $3000 to $2100 for single unit orders of the 2.5 microsecond 4K x 8 bit memory was made possible because full scale production costs turned out to be lower than expected, the company said.

A smaller version of the Model 1000 is being introduced. The new 1K x 8 bit version will be field expandable to a 4K x 8 bit system by the user, the company said.

The 4K system uses a 3D stack design measuring 5" x 6" x 3", while the 1K model will be a 3D stack design with the cores mounted on a single, pluggable printed circuit board measuring less than 0.7", the company said.

## Printer Selects Data From Mixed File

CELINA, Ohio – A new off-line printer with the ability to read a 7 or 9 track mixed tape file and to select out desired data for printing has been delivered to Reynolds & Reynolds Co. here by Data Products Corp.

The selective print feature of the L/PM-1000 system works by checking the beginning of each data block or of each logical record. The check, which can be on one or five digits, will result in the lines being printed or by-passed as desired. Identification characters are set on five selector switches in the unit and this information is used to search the tape records.

One character, x, is used to indicate that a character is not to be used in the selection. For example, to print only those lines whose five identification characters begin with the digits 8 5 5, the five selector switches are set at 8 5 5 x x. This results in a three character comparision with the two least significant characters being ignored.

### Reject Selection

The identification of records can be used either to select items to be printed, or, alternatively, items not to be printed. In printing an abstract of summary information and backups of detail lines in an edited report tape, for instance, it might be desirable to print all records except those with a key ending in the digit 9. This would be handled by setting the selector switches to x x x x 9 and setting the Reject switch.

## 'Computer World' Now 'Cybernetics 70'

NEW HAVEN, Conn. – When the *Yale Daily News*, publisher of such career guides as *Insurance World '67, World Business '68*, and *Finance World 1968*, decided to publish a guide to the computer field, the editors, not surprisingly, chose *Computer World* for the title.

But after a conference with the editors of *Computerworld*, they decided to change the name to *Cybernetics 70*, to avoid confusion.

The guide will be distributed free to 50,000 students at 25 colleges.

The purpose of the guide is to present a comprehensive picture of the job opportunities in the computer field and to interest readers in pursuing a career in the field. The articles will cover specific aspects of both the hardware and software divisions of the industry and also will discuss some of the opportunities for computer personnel in large industries such as finance, manufacture, and aerospace.

Some of the articles will be: "Instant Credit" by Arthur Ladd, American Express Co.; "Computers and Politics" by Walter DeVries, Harvard University; and "Automated Warehousing" by Dr. John R. Huffman, Aerojet General. IBM is preparing the introduction to the software section. *Computerworld* will be represented by "Introduction to the World of Cybernetics" by its publisher, P.J. McGovern.

Publication is scheduled for November, according to Thomas C. Miller, co-publisher.

## Touch Tone, No Phone

**Employees of the Western Electric Co. plant at North Andover, Mass., are using Touch Tone keyboards to enter data into a Honeywell on-line system. Touch Tone units eventually will be used by production workers at 200 work stations to enter data on product codes, number of units, and number and types of defects in connection with the manufacture of crystals for telephone and television equipment.**

# System Would Handle All Hotel Reservations

*(Continued from Page 1)*

The network could be expanded later to act as a clearing house service for allied companies.

### Computers Ordered

To operate the network, Nars has placed a $15 million order with Burroughs Corp. for two large scale B6500 systems, six smaller B500 systems, and 600 TC500 terminal computers. Burroughs will maintain the equipment, cooperate with Nars in design of reservation and hotel-motel on-line accounting systems, and aid in the programming of applicational packages.

The first two B500s are scheduled for installation here by the end of September. The third and fourth computers here, as well as one in the Eastern and one in the Western parts of the United States, are scheduled for installation in January. The B6500 systems will be installed as transaction volume increases and greater computer capability is required.

### Principal Functions

Gaines said the new communications computer network's principal functions are to provide:

+ A public service reservations and clearing house service for individual hotels and motels, for chain and referral organizations, and for allied companies such as car rental agencies, major oil companies, airlines and other travel related companies, and to reduce the cost of making out-of-town reservations.

- A credit validation program and communications computer network for handling credit inquiry at a more reasonable rate.
- A message reporting service for individuals or companies, especially during the evening and night hours.
- An on-line accounting and in-house guest accounting service for hotels and motels.
- A supply ordering service and other programs in real estate, insurance, banking, and publishing.

### Special Terminals

Gaines said that the TC500 terminal computers will be utilized principally for the last three functions because they have a unique processing ability of their own in addition to being able to communicate with the B500 and B6500 computers.

The system will be capable of handling over 100,000 accesses into the computer center in a one hour period, or almost 28 a second, the company said. The total value of equipment, communications, and programming development over the next five years will approach $100 million, it said.

Nars will utilize inward wide area telephone service and more than 100,000 miles of dedicated private lines. Terminal devices in satellite centers and hotels and motels will range from low cost units to high speed sophisticated terminals such as CRT display consoles, depending upon the volume each center is required to handle.

### Small Users

The system will also be available to the small user who has only a telephone with which he can call the nearest center.

In addition, a clearing house program will be available to chambers of commerce and local industry groups.

# Goodyear Orders 16 SDS Computers

LOS ANGELES – Goodyear Aerospace Corp. has ordered 16 Sigma 5 computers and related equipment for the 2F90 flight trainers it is building for the Naval Training Device Center.

The SDS computer systems will be key elements in the trainers, which are used to simulate flight characteristics of the Navy's TA-4F carrier based jet fighter. E[illegible] trainer will use two Sigma 5 central processing units, SDS said.

# Plotting Speed Varies With Radius of Curve

LONG BRANCH, N.J. – A new plotter with a different method of controlling the pen, which allows unusually high plotting speeds, is being shown here by Electronic Associates, Inc. The EAI Series 430 Dataplotter is designed for off-line plotting on a 30" x 30" surface, and allows typewriter style alphanumeric printing from an optional 48 character symbol printer.

### Speed Varies With Radius

The unusual character plotter is in the control circuits which "look ahead" and optimize the speed of the plotter according to the actual curve which is coming up. This is in contrast with the normal incremental plotter where the speed is operator controlled by setting at the beginning of the plot without direct reference to the actual content.

### Curves Broken Down

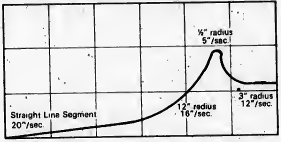
The 430 plotter breaks down curves into those which have a radius of under .5", 3", 12" or greater than 12". At the .5" radius situation the speed is 5" per second, rising to 12" per second for a 3" radius curve, 16" per second for a 12" radius, and 20" per second for a shallower segment.

The digital interpolation system is used which fills in between well spaced data points with a .002" resolution. During this interpolation a third order polynomial is employed. EAI claims it is able to do five times more work than any other digital plotter and backs this up with comparisons between the 430 comparably priced incremental plotters and high priced incremental plotters, as shown in Figure 1.

| | EAI SERIES 430 DATAPLOTTER | INCREMENTAL PLOTTERS WITH STEP MOTORS | |
|---|---|---|---|
| | | COMPARABLY PRICED | HIGH PRICED |
| Straight Lines | 20 inch/sec. | 0.6 inch/sec. to 0.8 inch/sec. | 3.3 inch/sec. to 4.6 inch/sec. |
| Shallow Curves (≥12" radius) | 16 inch/sec.* | 0.6 inch/sec. to 0.8 inch/sec. | 0.9 inch/sec. to 1.2 inch/sec. |
| Intermediate Curves (≥3" radius) | 12 inch/sec.* | 0.6 inch/sec. to 0.8 inch/sec. | 0.9 inch/sec to 1.2 inch/sec. |
| Sharp Curves (≥.5" radius) | 5 inch/sec.* | 0.6 inch/sec. to 0.8 inch/sec. | 0.9 inch/sec. to 1.2 inch/sec. |
| "Type" Printing | 260 Characters per minute avg. | Not offered | Not offered |

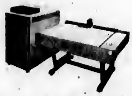
**Curve Mode*

*Fig. 1. Comparison of Maximum Writing Speeds with 0.002" Resolution.*



*Color indicates the regions in which "look ahead" acceleration control is applied.

*Fig. 2. "Look Ahead" Acceleration Control.*



**EAI Series 430 Dataplotter** →

# CUDC Forms 'Human Factors' Division

WASHINGTON, D.C. – Computer personnel oriented to commercial or scientific applications often have difficulties handling applications in the education and social sciences areas, according to Computer Usage Development Corp.

To meet the need in these areas, CUDC has formed a Human Factors Research Division under the direction of a psychologist, Ralph Gutekunst. Members of the division have experience in attitude testing and opinion polling via mail surveys and interviews.

The division, the company said, has the capability to perform both manual and computerized analysis of data to produce tabulations and cross tabulations of responses, measures of correlation and statistical significance, and cost-benefits analysis. The members have overlapping technical skills in such disciplines as psychology, sociology, and economics, as well as in programming analysis.

### Current Contracts

Current contracts cover such areas as manpower training, demographic analysis, program planning, program evaluation, user preference analysis, resource allocation, social systems simulation, and personnel studies, the company said.

## *'Social Systems' Center Opened*

SILVER SPRING, Md. – The Lockheed Aircraft Corp. has opened the first of a series of regional "social systems" centers in this Washington, D.C. suburb.

Work in systems analysis and engineering for medicine, government, and education will be handled by the center, called the Atlantic Branch Operation, Information Systems, Lockheed Missiles & Space Co.

Previously all of Lockheed's systems work has been done at its Sunnyvale, Calif., facilities. Lockheed describes the operation as the application of systems skills to such social needs as the war on crime and the national drive for better health.

The new office will bring the staff closer to some of the hospitals, blood banks, and state and local governments the company serves.

# *Multiple Services Offered by New Firm*

PALO ALTO, Calif. – A new firm headquartered here is offering a combination of services. Its three phase approach is closer to a "full service" concept than that of other software firms, although the firm uses a name suggestive of only one of its services, Computer Time-Sharing Corp. (CTC).

The three service components are: contract software – ranging from simple application programs to massive complex systems to compilers; leasing – ranging from small to large computers, and from full configurations to individual units; and time sharing – ranging from computational to business oriented languages and terminal services.

CTC has concentrated its initial efforts on contract software and on leasing since these require less preparatory effort than time sharing. It is already performing on contracts in those two areas. To offer the full range of services, CTC is establishing offices in the Sacramento, Seattle, and Los Angeles areas.

### Negotiations Resumed

NEW YORK – The American Telephone & Telegraph Co. has resumed negotiations to sell its TWX teletypewriter service to Western Union. The talks, begun in 1966, were broken off by AT&T because of WU's plan to merge with Computer Sciences Corp. The merger has since been cancelled.

# Editorials

## I/O Committee

E.D. Poorte recently told *Computerworld* that the effective use of the work which has been underway for the past three years by the ad hoc committee on I/O will not come before the fifth generation. This is unfortunate. The I/O problem is one which already has been solved to some extent in third generation computers, and yet it appears that some of the more unsatisfactory facets of current day solutions still will be with us for years to come.

What is more incredible is the fact that there has been little objection to Poorte's statement by users, who are, after all, among the major losers. He is quite right when he says there is a great deal of work to be done, at least in the way we currently are approaching standardization. But is this not another good reason to be prepared to discard today's way of approaching standardization and to come up with something new – something which can be responsive to our needs?

Fifth generation delays such as this are certainly not responsive.

## Two Is Too Much

The problem of who watches the watchers is always with us, and it was with considerable shock last week that the computer community noticed a mass circulation magazine pointing the finger of suspicion at not one, but two of the most noted legislators who are involved in computer problems.

Sen. Edward Long, with his recent committee hearings on computer privacy, has undoubtedly helped the industry pinpoint its problems in a way which probably no other type of procedure could have. Rep. Cornelius E. Gallagher equally deserves the thanks of the industry for his service in drawing attention to many of the unsolved problems on the use of computers. They have served us well and in the way that we expect our watchers to watch both us and the committee.

However, it would be foolish to close our eyes to the accusations that have been made. It is not necessary that these accusations be believed, but it is obvious that we must consider whether or not the Mafia has, or can, infiltrate into the policies of the computer community. We are now working on finding out the facts, and we will report them as quickly as possible, hopefully starting next week.

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**Research Report**

# What You Should Know About Disk Pack Errors

The action on a magnetic tape when an error occurs is readily obvious. The tape reverses, and if someone is watching, he can actually see the reel rocking backwards and forwards, trying to remove the error. Tapes are considered old fashioned nowadays and in their stead we have disk packs – the new fashioned item. One of the characteristics of disk packs is that errors are not obvious. The disk keeps spinning merrily – the arms keep moving – and you can't see that anything unusual has happened.

*The fact that the error is not obvious to the operator may itself be very important, for management purposes at least.* It is well worth trying to work out exactly what does happen when an error is encountered.

### Two Controlling Factors

Let us use the IBM 2311 disk drive as an example. This has six disks with ten recording surfaces. Each disk has 200 tracks on it and the heads can read all the tracks in the "cylinder" (at once without any further head movement). In addition to the 200 tracks used for data, there are three extra track positions. These are at the inside of the disk pack and are used as alternate tracks when one of the original tracks is not in operation because of a known error on it.

Unfortunately, the computer system does not know of the track error *until it actually moves to it – and then only after it has started trying to read the track* does it discover that it must read from an alternate track instead.

This fact, combined with the physical placement of the alternate tracks at the end of the disk, are what define the cost of a disk pack error.

### Timing the Errors

When a reference is made to any item on the faulty track, the disk drive arms must move from the track to the alternate. This takes longer than an average access move because the arms are at the extreme end of the disk. Average access time (75 milliseconds for the Model 2311) is computed by averaging all possibilities and is approximately a movement of 60 or 70 tracks.

By contrast, the average movement to an alternate track spans approximately 100 tracks. It can vary from 25 milliseconds up to 135 milliseconds. In addition, there is also the standard rotational delay of another 12.5 milliseconds.

So the cost in time for a movement from the time the program is expected to be ready to start reading to the time it actually is able to start reading is approximately 100 milliseconds.

But, that is not the end of the cost, because with the placement of the alternate tracks on the inside of the disk there will be a longer than normal access time to the next record. This may occur in two instances: (1) where the return access is to the same place (as in cylinder mode operation), and (2) where the return access is to some random position. The second instance is a fairly simple one. The additional time spent will average the difference between the random movement (75 milliseconds) and a movement from an inside edge (87 milliseconds or 12.5 milliseconds), giving a total additional cost of 112 milliseconds.

However, where the cylinder mode is being used, and where there is a return to the original position, the whole of the second movement is actually additional cost – because you would not expect any movement if an error had not occurred. The cost for an error during cylinder operations is, therefore, approximately 200 milliseconds.

### Is It Important?

On the surface, 112 milliseconds or 200 milliseconds is not very much. The operator won't see the arm moving and it often can go unnoticed. But, management needs to know that it is important.

The question is: How often does it occur? The answer, because of the fact that the computer does not find out that an error condition exists until after it has accessed the bad track, is that it occurs every time a record which, theoretically, is on the affected track is accessed. (One slight exception: a read record, a read and write update, and a read-write and check, all count as a single access.) So, it is quite possible to be accessing a particular track quite a number of times a day. In fact, there are 2000 tracks on a disk pack. A disk drive can refer to, and update all the tracks randomly within five minutes so that you could have 12 references an hour to one of these tracks and between 1-1/2 to 2 seconds would be wasted per hour per error. The waste is not just of the disk pack but of the whole computer system, or at least that portion of it which is involved in running the particular program concerned. This includes the other related disk drives, disk controllers, tape units, central processor, and other peripherals and can become quite expensive.

### Minimize the Effects of Errors

Understanding how an error works in a given situation allows a systems analyst to design his system so as to minimize the effects of an error. The reserve tracks are on the inside edge.

Frequently referenced files – which are going to be most costly to access if an error develops – should be placed as close to the inside edge as is operationally allowable. For instance, it may be worthwhile to place them at approximately Track 133 rather than at Track 67.

Check the track addresses against a directory of bad tracks. This, unfortunately, involves a software programmer in providing his own reserves because he cannot directly address the reserve tracks. However, if he does have available spare tracks, he can prevent the arm from going to the original bad track with a quite small, simple routine. Assign files to avoid bad tracks and reassign where appropriate. This, however, is a continuous and hard job.

*Acknowledgement is made of the Memorex study, "Do you know the real cost of your disk pack errors?" which formed some of the input for this article. Copies are available from Memorex Corp., Memorex Park, Santa Monica, Calif. 95050.*

# Letters to the Editor

### DOS Problem

To the Editor:

On page 11 of the July 17 edition of *Computerworld* you have a few words to say about DOS release 17.

The point and purpose of this letter is to contend that the Sysgen times in your Figure 1 are the result of some estimating process that has no discernable relation to the process described. Simply to fetch one set of modules from the library so they could be cataloged took 52 minutes. The displays, catalogs, and condenses took well over an hour. This does not include desk time, or the time spent in applying PTFs. If everything ran perfectly, and I could just put all the jobs I ran to update my system in the bin and let 'er rip, it would take more like 2-1/2 to 3 hours to do the job.

Maybe your system was updated on a Model 65 with a 1403N1 printer and all the disks on different channels. Perhaps those three 90KB tape drives helped, too.

The fellow with one selector channel on a Model 30 disk-only system is going to lose faith in you if you don't take to qualifying your statements a little more. He might even wonder if the fellow who writes the editorials ever sees the rest of the paper.

I'm not really mad at you. It's just that we expect better things of *Computerworld*. Keep up the good work.

James S. Taylor
J.R. Ahart, Inc.
Dayton, Ohio

We will try to specify the system more carefully next time. Ed.

**Have a Comment? Just Call Us!**

**To make it easier for our readers to express opinions *Computerworld* has set aside a special telephone to allow readers to call in comments for the Letters to the Editor Column. Just call (617) 527-2711 day or night and your opinions will be recorded on tape.**

**Viewpoint**

# An EDP School Director Answers Critics of Schools

*There have been many criticisms of the private EDP schools. One school has decided to answer back – technically. Here is one answer, written by Richard Soucie, Executive Director of CPI, a Hartford, Conn. school. Comments are invited.*

The present situation in computers and in the personnel needs for computer installations is not the same as it used to be.

The days when programming represented only the tedious job of coding have long since vanished. First and second generation computer programmers worked with slower equipment that had limited I/O capabilities and involved limited applications. The coming of the multi-faceted third generation systems with their advanced technology and operating systems evolved a new breed of programmer. He is the product of a technology which demands a comprehensive understanding of hardware and software and of its effect on new scientific and business applications.

### New Methods Needed

The old method of data processing education has not kept pace with the demands of the new technology. New and advanced educational techniques and facilities are needed to fill this demand.

In examining this, we at CPI broke the general statement down to a set of technical requirements: what the facilities should be able to do, what the environment should be, what the role of videotape, CAI, etc., is. These requirements are shown in Box A.

In our opinion, the fact that these are requirements means that the cost has become prohibitive for in-company training. The implementation of these techniques is, therefore, left to the various EDP schools, private and public, because of the need for advanced equipment and because of their association with DP service bureaus.

Such is our case and we believe the students in our school receive adequate and reasonable training.

### Modern Equipment

The students are trained on an IBM 360/30 system which, in the future, will be upgraded to a Model 40 system with teleprocessing and time sharing capabilities, and with a projected CAI package.

CPI is constantly updating the hardware configuration, its teaching techniques, and its curriculum. So far this year, $50,000 has been invested in the curriculum itself.

Teleprocessing is the centralizing force that ties in the decentralized computer facilities of the New England network.

### Subjects Covered

CPI offers an 800 hour curriculum in "Advanced Computer Programming" and a 750 hour curriculum in "Advanced Computer Operations/Programming." The advanced programming course covers in depth 1401 Autocoder, 360 BAL, Cobol, RPG, and Fortran. The student must write several actual business programs in each of these languages in addition to a three-to-four week case study on a specific application.

The operations/programming course produces operators qualified in IBM 360/30 and DOS operations, as well as RPG programming and utility program preparation.

The students receive hands-on training on an IBM 360/30 DOS system utilizing disk, tape, and standard peripherals.

The 1401 is taught as a result of industry's need for conversion of present 1401 systems to a third generation hardware.

### Emphasis on Efficiency

Emphasis is placed on the efficiency of computer run time and on core usage resulting from the use of assembler versus compiler type languages, direct access devices, operating systems, and a thorough comprehension of debugging techniques.

Naturally, the quality of their work will also depend upon the staff and on how good the students are. We publish our entrance requirements and currently our instruction staff has an average of five years' experience in DP. We feel that this, combined with the course details, form an answer to some of the stories about EDP schools.

### Qualified Graduates

Some of the stories may be true, but we feel that we are meeting the needs of the computer user by offering an adequate education for computer technicians, programmers, and operations personnel. We believe that we are not just producing trainees, but qualified people.

We suggest that you take a second look at the new breed of EDP schools. They are an essential part of the supply chain for computer personnel. On second thought, take a first look – you have never seen anything like this before.

## The Requirements of the Situation, as Seen by Richard Soucie

### Instruction Level

Instruction in data processing must reach to the detail necessary for complete comprehension of machine languages. Register concepts, hexadecimal core dumps, and computer logic are necessary for in-depth understanding of third generation hardware/software capabilities.

### Facilities

Hands-on training must be available for student testing of programs. Hardware/software combinations must include direct access devices, magnetic tapes, operating systems, and utility programs to allow the student to write comprehensive and meaningful applicational programs in both assembler and compiler languages.

### Business Oriented Environment

Training of future programmers should include constant exposure to business methods and techniques. Further, the students' business knowledge should be broadened by speakers and lecturers from industry and by the professional experience of instructors themselves. A service bureau connected with the school would cause the data processing atmosphere to overflow constructively into the educational environment.

### Other Computers

The student should be given an appreciation and an awareness of the capabilities and features of *all* computer systems, ranging from small to large computers, in the areas of science and business.

### Video Tape

Video tape provides the capability of dynamically illustrating computer concepts and normally unobtainable subject matter directly in the classroom. Hence, other applications, computer, and operating systems external to the school facility can be demonstrated first hand.

### Computer Assisted Instruction

"Let the computer itself assist you in learning programming languages at your convenience!" This tutorial approach will prove beneficial to both the advanced and the slower students in that additional information or review material is available outside of formal classroom sessions.

### Teleprocessing

In an attempt to bring the computer facility closer to the student, systems packages are being developed which, through teleprocessing, can utilize decentralization to its fullest extent in a total educational network. The teleprocessing approach is well suited to training new programmers who are geographically removed from the central computer facility.

## CW Racing Car Places Third

BRIDGEHAMPTON, N.Y. – *Computerworld*'s racing car came in third in a field of seven in the Area 1 championships here Aug. 11.

The Triumph Spitfire Mark II, driven by Bob Ziegel, *Computerworld* advertising service manager, stayed with the leaders for the first seven laps, but then the water pump gasket failed.

The next race will be Aug. 17 in Thompson, Conn.

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# Masters Courses Ignore Business DP

NEW YORK – A survey of masters courses in the computer sciences shows that the average curriculum ignored the business area, although it is the largest sector of the computer community, and that a surprising number of students never learned an assembly language.

Few graduates did any analog computation, the survey shows, and few curricula included courses which were primarily application oriented, although many curricula emphasized that the computer is a tool.

### 23 Schools Surveyed

These conclusions came out of a survey just published by Roger Elliott of Texas A&M University. It was based on data on more than 296 students at 23 schools who received masters degrees in computer sciences during the 1966-67 year. The schools were asked to say what percentage of the students took various types of courses.

Elliott noted that most of the curricula steered a center course between the applications orientation of traditional engineering or business curricula or the theoretical orientation of a modern mathematics curricula. In the course of his comments he noted that he felt that some of the course orientations were "hardly justifiable" although they were consistent with the ACM recommendations. This applied particularly to the fact that in nearly half the programs none of the students learned Cobol, studied DP management, system design, information retrieval, or business applications. Indeed, he found that more students learned list processing than learned Cobol.

### Overemphasis on Software

Software appears to have had a great deal of emphasis, more so than hardware design and construction. Only one out of the 23 schools surveyed reported that all their students took a course in hardware design, while nearly half reported that none took such a course.

Portions of the questionnaire and the responses are shown in Figure 1.

Fig. 1. A breakdown of part of the survey answers.

| Question | Analysis by Response By Schools | | | | |
|---|---|---|---|---|---|
| | None | 25% | 50% | 75% | All |
| How many of these students were competent in some assembly language? | 0 | 1 | 2 | 5 | 17 |
| Fortran, Algol, or Mad? | 0 | 0 | 0 | 1 | 24 |
| Cobol? | 11 | 6 | 2 | 4 | 2 |
| How many of these students took a course in "algorithmic processes"? | 7 | 1 | 5 | 2 | 10 |
| a course in the design of computer circuits? | 11 | 7 | 6 | 0 | 1 |
| a course which dealt with the design of data processing systems and procedures? | 14 | 4 | 1 | 3 | 3 |
| a course in which they learned to operate a computer and various peripheral devices? | 16 | 2 | 0 | 1 | 6 |
| a course in analog computation techniques? | 16 | 6 | 1 | 2 | 0 |
| a course that could be roughly characterized by the title "computer applications in physical sciences"? | 16 | 4 | 3 | 1 | 1 |
| a course that could be roughly characterized by the title "computer applications in social sciences"? | 21 | 3 | 1 | 0 | 0 |
| a course that could be roughly characterized by the title "computer applications in business"? | 15 | 4 | 4 | 0 | 2 |
| a course that could be roughly characterized by the title "computer applications in statistics"? | 14 | 4 | 2 | 3 | 2 |

# New DS-3 Has Independent Read, Write Tape Drives

**New Products**

A new magnetic tape buffer store, the DS-3, provides independent read and write tape drives with associated electronics operating on a single closed loop of tape. Input and output are in 8-bit parallel format with rates controlled by the external equipment. Operation of either or both drives is asynchronous from 0 to 333 characters per second. Space is provided for additional plug-in circuitry to accommodate special interface requirements. A horizontal tape compartment is included to house the magnetic tape and the write and read drive mechanisms. Wiltek, Inc., 59 Danbury Rd., Wilton, Conn. 06897.

### Core Memory

A new core memory, Micra Stor, is supplied with self-test, Data Saver, and displays on all registers. The unit, with a capacity of up to 8K x 18, has a 1.75 microsecond cycle, servo controls on all critical voltages, and expansion capabilities with "party line." Delivery takes approximately three weeks. Standard Memories, Inc., 15130 Ventura Blvd., Sherman Oaks, Calif.

### Badge Reader

A new 10" x 10" badge reader is designed to provide users with both electrical and mechanical reliability. Mechanically, the new unit can be supplied with either rear mounted connectors or wire lead terminations. Card feed is manual and contact probing is solenoid operated. Sealectro Corp., 225 Hoyt St., Mamaroneck, N.Y. 10543.

# 3 Plants Get On-Site Management

BRIGHTON, Mass. – Honeywell's Electronic Data Processing Division has established on-site management for the division's three Boston area plants and has created five new positions.

"These changes will give us the balanced management we must have to meet the division's increased production schedule," said Frederick G. Miller, vice president – manufacturing. "The new directors will be responsible for their areas of concern throughout all three plants. At the same time, the new plant managers will be responsible for activities within each plant, giving us direct, on-the-scene management."

Previously, functional managers responsible for such areas as quality control and engineering at all three plants reported individually to Miller. No executive was responsible for over-all operations at each plant.

The new directors are Robert Dushan, director – engineering planning; J. Lawrence Joyce, director – plant engineering; Robert LeVert, director – quality assurance; Bruce Dobberteen, director – manufacturing; Frank Dewar, director – purchasing.

# Pass System to Be Marketed Jointly

LOS ANGELES, Calif. – Scientific Data Systems and Mauchly Associates, Inc., Montgomeryville, Pa., have agreed to market jointly the Pass seismic data processing systems that consist of SDS Sigma computers and Mauchly developed software and special purpose analog and digital peripheral equipment.

Mauchly's Pass/1, Pass/2, and Pass/3 seismic systems are new products which utilize the SDS Sigma 2, Sigma 5, and Sigma 7 computers.

The systems sold under the agreement by either company will be installed and maintained by Mauchly through its subsidiary, Digital Seismic Corp., Houston, Texas.

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W.R. Leitch

M. Biondo

B.J. White

R.J. Supp

R.N. Colin

# Project Rescue Lets Contract For Conn. Study

PHILADELPHIA – The Regional Educational Service Center through Unified Effort (Project Rescue) has awarded a contract to Computer Usage Development Corp. to study the possibility of establishing a regional educational data processing center to serve the educational and administrative data processing needs of 21 school districts surrounding Danbury, Conn. The amount of the contract was not disclosed.

## CONTRACTS

### Radio Links in Malaysia

KUALA LUMPUR, Malaysia – The Malaysian Telecommunications Department has signed a $650,000 contract for radio links with Standard Telephones and Cables Pty. Ltd. of Sydney, Australia, an ITT affiliate. The three year contract calls for the supply of transistorized VHF/UHF radio transmitters and receivers for spur routes linking smaller towns with the main trunk telephone system. The new equipment will expand direct telephone subscriber trunk dialing in the rural areas of west Malaysia and Sarawak. The contract was signed in Kuala Lumpur by Malaysia's director general of telecommunications.

### Classified Work Continued

LITTLE NECK, N.Y. – The Air Force Aeronautical Systems Division has awarded a letter contract of approximately $800,000 to the Hazeltine Corp. to supply classified electronic equipment. The production contract is a follow-on to previous development work by Hazeltine for the Air Force. When completed, the contract should approximate $2 million.

### Tape Drives Ordered

REDWOOD CITY, Calif. – A $300,000 follow-on contract for continued delivery of Model TM-7 digital magnetic tape transports has been awarded by Data Products Corp., Culver City, Calif., to the Ampex Corp. The TM-7s are used in digital printout systems produced for computer manufacturers and end users.

# New London Navy Center Installs Univac 1108 System

## Orders and Installations

A Univac 1108 system has been installed at the Navy's Digital Computing Branch Center at New London, Conn. The unit will be used for sonar and electromagnetic system design and analysis, solution of mathematical equations, scientific data processing, and design review.

Florida Technological University at Orlando has ordered a Honeywell Model 1200 computer system. The university will use the system in a computer oriented curriculum leading to a bachelor of science degree in computer science. All personnel in major university administrative areas will be taught a simplified programming language called Bestop (business economic statistical operational program) as well as Cobol.

Electronic Processors, Birmingham, Ala., has ordered a leased Burroughs B3500 system to provide services to city, county, and state governmental agencies as well as commercial enterprises in Alabama. Future plans for the system will involve offering on-line services.

Northampton Commercial College, Northampton, Mass., has installed an NCR Series 500 system which will enable the school to offer a teaching program in data processing. Wright State University, Dayton, Ohio, has ordered an NCR Century 100 to be delivered in February 1969 to be used for administrative applications.

KLM Royal Dutch Airlines, The Netherlands, has ordered $3 million worth of Dids-400 information display equipment from Raytheon, Lexington, Mass. The equipment will be used to speed reservation arrangements for KLM's more than two million passengers annually.

The Columbia Presbyterian Medical Center, New York, has installed a computer controlled intensive care monitoring system, procured from SYS Associates, Fort Lee, N.J. Utilizing an IBM 1130 computer, the system will monitor the various sensors connected to the patient, alerting hospital personnel to the patient's condition and providing an information retrieval system. Initially, the system will monitor five patients.

The Los Alamos Scientific Laboratory of the University of California, Los Alamos, N.M., has installed its fourth Control Data 6600 in its Computer Science Division. The laboratory is a prime contractor to the Atomic Energy Commission.

Recent installations in Hungary include three IBM 360/20s, one each at the Hungarian National Insurance Co., the Central Statistical Office, and the Directorate of Pensions. The Agricultural Research Institute has installed an IBM 1130.

The University of Illinois at Urbana has installed an SDS Sigma 2 computer for high energy physics studies. The unit will be mounted in a trailer. Studies are being sponsored by the Atomic Energy Commission.

Babcock & Wilcox, Lynchburg, Va., has ordered a Control Data 6600 computer system and an associated Control Data 1700 control system. The system will be used to provide hybrid computing capability in the solution of design and engineering problems. The 1700 control system will be connected to two analog computers and to the 6600 digital computer. Delivery is scheduled for later this year.

Strategic Datacenters, Inc., a subsidiary of Strategic Systems, Inc., has ordered an IBM 360/40. The new unit is scheduled for delivery in early fall. The company has just completed the installation of its second IBM 360/30.

# Bankers Data Moves Into New Quarters

Chicago – Bankers Data Corp., formerly located at 330 S. Jefferson St., is now in expanded quarters at 425 N. Michigan Ave. The new premises provide BDC with double the area it formerly occupied. Plans call for new computer equipment.

## Expansions

### Ness Forms New Division

PALO ALTO, Calif. – Gordon L. Ness Associates, marketing and management consultants, has formed a new division oriented to consumer electronics. Heading the new division, called Consumer Technology, is Hank Hughes as general manager. Specific products or lines were not disclosed.

### CAS Relocates Corporate Offices

ENCINO, Calif. – Computer Applied Systems has relocated its corporate offices from Tarzana, Calif., to 18075 Ventura Blvd. here. The company also announced the opening of a branch office at 1730 W. La Palma Ave., Anaheim, Calif.

Computer Applied Systems has been heavily involved in commercial systems design and software, and now is developing proprietary software packages. Capabilities of the company and examples of projects performed are presented in a new brochure.

### LRS Moves To New Plant

WEST NYACK, N.Y. – LeCroy Research Systems Corp., formerly in Elmsford, Westchester County, has moved to larger facilities in West Nyack, N.Y. The new plant has three times the capacity of the previous facility.

7070/74, 7080, 7094 FOR SALE

IPS has for sale and delivery in the near future several attractively-priced IBM 7000 series systems. Available for immediate delivery is a very reasonably-priced 7070 10K without tapes. A 7074 10K with 7 729 VI (90KC) tape drives can be delivered Nov. 1st. Also for immediate delivery is a 7080 160K system without tapes. For an installation requiring a powerful scientific system, a 7094-I with 14 729 VI's & V's is available Jan. 1, 1969. The 7094 also has a 1401 4K I/O system, as an option. For prices and details, please call or write.

IPS

INFORMATION PROCESSING SYSTEMS, INC.

200 WEST 57TH STREET NEW YORK N.Y. 10019 (212) CIRCLE 6-2267

# Computer, CRT Displays Help Police

KANSAS CITY, Mo. – "2312 to dispatcher. Give me a computer check on Missouri license number PA 1234."

Within seconds, this Kansas City policeman gets a report from his dispatcher: "Danger. Car registered to Frank Blitz, wanted for armed robbery. Known to be dangerous." The computer has made another "hit," and a policeman has been warned of a hazardous situation.

But if the car and owner are "clean," the car continues on its way, the driver unaware of the check. The policeman has been saved trouble and an innocent person has been spared harassment and inconvenience.

### Computer Has Reputation

"Computer is one of the most common words on the police radio now," Melvin Bockelman told *Computerworld*. Bockelman, manager of computer facilities for the Kansas City Police Department, is responsible for Alert (automated law enforcement response team). He calls it the nation's most extensive computer based police information system.

The Alert network centers on an IBM 360/40 at police headquarters. Each of the seven zone headquarters has an IBM 2260 visual display terminal linked to the computer.

The system contains information on 25,000 people, including: persons wanted by the police, persons on parole or probation, habitual criminals, and persons suspected of involvement in organized crime.

### Arrest Records

For each of these people, the system contains arrest and conviction records, nature of arrest warrant or reason for pickup order, fingerprint code, last known address, and history of resisting arrest, carrying concealed weapons, or attempting suicide.

People are listed both by real name and by all known aliases to increase likelihood of identification.

The system also contains the license numbers of stolen cars and cars owned by people wanted by the police. When the computer checks a license number and does not find a listing, it automatically checks licenses that are one number off.

In addition, the files contain certain information about policemen and civilian police employees, including blood type and persons to be contacted in case of emergency.

### Started Last Month

The system has been in partial operation since July 10. It is in operation 24 hours a day, but due to a manpower shortage, only six days a week. On Sunday, policemen are forced to use the old manual record system, which is still being kept up to date. Full time operation should begin soon, according to Bockelman.

Kansas City Police Chief Clarence M. Kelley gets information from the computer via a dispatcher in the Communications Control Center.

During July, the system received over 6000 inquiries from police officers, and processed 10,000 record changes. But the police are still unfamiliar with the system, and are not using it as frequently as they could. At first, no pressure was put on them to use the computer, and most didn't. Then field sergeants were brought into the computer room and the system was explained to them. They talked to their patrolmen, and the next week the response was "real good," Bockelman said.

The police department feels that as the men become more familiar with the system, more will use it. Bockelman said that they were taking a positive approach, stressing the number of "hits" made with the aid of the computer. He also said that they would probably issue commendations to the men who were making most use of the computer.

### Other Uses

Through multiprogramming, the system also does accounting, inventory control, bookkeeping, and payroll operations, as well as analysis of crime statistics and motor vehicle accidents.

The system took two years to develop and cost over $1 million. There was no federal aid involved. The money came from a general police department bond issue, approved by the voters several years ago. Specific uses of the money, such as Alert, required city council approval.

Two expansions of the Alert system are slated for next year. By May, Bockelman hopes to have a direct interface with the FBI's computer based National Crime Information Center (NCIC). The FBI system contains a national list of wanted persons and stolen cars. At present, Kansas City has the usual teleprinter link to the center, which must be queried separately from Alert. But when the interface is completed, Alert will automatically check with the federal system.

Sometime next year, Bockelman hopes to add stolen property lists to the system. Stolen items will be listed with the system as soon as they are reported. Then, if a policeman stops a suspicious car with a TV set in the back seat, he can immediately check whether it is stolen. Currently, it takes 24 hours or longer to get stolen property lists compiled and out to police officers in the field.

### Size of the Job

The 940-officer Kansas City, Mo., Police Department patrols a 316-square mile area with a population of 599,060. In addition, the department participates in metropolitan area protection of approximately 1.2 million persons.

Department reports show investigation during 1967 of 62 murder or manslaughter-by-intent cases; 51 negligent homicides; 231 cases of rape; 2120 robberies; 1373 aggravated assaults; 753 assaults, non-aggravated; 9455 burglaries; 4471 felony thefts; 8467 petit thefts; 4835 stolen autos.

In his annual report to the Board of Police Commissioners, Kansas City Police Chief Clarence M. Kelley said the crime statistics for 1967 reflect a 12.3 per cent increase over 1966.

In addition to the new computer based information system, the police department has added a helicopter patrol and a modernized communications control center.

## *Kansas City More Alert*

PHOENIX, Ariz. – By the time a federal study said it could be done, someone had already done it.

The study was made by the Phoenix Police Department and Griffenhagen-Kroeger, San Francisco public administration consultants, with a $95,485 grant from the U.S. Department of Justice. It proposed a system called Alert (automated law enforcement reporting technique). Phoenix Public Information Specialist Richard Teylor stressed that "this was just a study on how to set up a system. It was only devised on paper."

The proposed system is almost identical to Kansas City's Alert (automated law enforcement response team). The Kansas City system, developed without federal aid, was in operation by the time the Phoenix Alert proposal was completed. The Phoenix study took three years; Kansas City took two years to do a study, develop the system, and put it into operation.

Phoenix Police Capt. Richard Newton, project director for the study which proposed Alert, admitted to *Computerworld* that he had not heard of Kansas City's Alert.

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# System Checks Ailing Autos, Estimates Repairs

EAST MEADOW, N.Y. – Computers may soon help diagnose what's wrong with the ailing family car. This is the aim of an experimental computerized automobile diagnostic system now under full scale tests by Mobil Oil Corp. and IBM. The system is located at the Mobil Car Repair Center in this Long Island community.

The experimental system is built around a computer which links much of the center's test equipment. It can spot within minutes any of more than 100 conditions that can make the family car unsafe or uneconomical to drive.

The computer monitors the car's performance from electrical and mechanical measurements sensed by diagnostic instruments. These are compared with the factory specifications prestored on a small disk pack, which contains complete information on every American car manufactured during the past 10 years.

### Repair Estimates

The computer prints out a form telling the motorist what repairs are required, what parts need replacing, what the parts cost, and what the cost of labor should be. Repairs can be made at the center by Mobil mechanics or the car owner may take the diagnosis, parts, and repair cost estimate to the garage of his choice.

The experimental computerized automotive diagnostic system is being tested through the summer under the terms of a joint study with Mobil. No plans have been made for computer installation at the other repair centers.

"After studying more than 100,000 cars in our five repair centers, we believe that automotive diagnosis and repair can be treated as a science, rather than an art. The addition of the computer is a logical step in that direction," William A. Kolinger, president of Mobil Centers, said.

### 25 Minutes per Car

Cars brought to the centers for diagnosis are checked in "diagnostic bays" where they undergo 75 tests using 23 different testing systems. The East Meadow computer operation involves 112 tests.

Ailing autos are tested on chassis dynamometers, devices that make it possible to conduct tests under actual driving conditions even though the car is standing still.

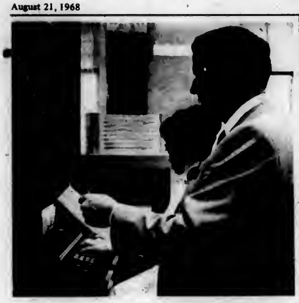
Several experimental devices have been built for the test by IBM's Mohansic Systems Laboratory including:

- A unit that links the car's electrical system to the computer and tells the spark plugs precisely when to fire.
- A brake test display board that guides the diagnostician as he conducts braking tests on all four wheels.
- A control panel that triggers many different engine tests and informs the diagnostician when the computer has received the information it needs.

The experimental control panel and electronic braking board are used by the diagnostician together with an IBM 3000 portable data recorder to conduct the test. Visual observations, such as faulty lights, mufflers, or shock absorbers are punched into standard IBM cards using the portable recorder.

During the electronic analysis, thousands of individual performance samples are recorded as the diagnostician performs basic tests which are evaluated by the computer as "Satisfactory," "Adjust/Marginal," or "Repair/Replace"

Using a control panel placed next to the driver's seat, a diagnostician performs engine tests. The experimental unit at left links the computer to the car's igniti system.



**Replacements for lost, stolen, or destroyed driver's licenses, which used to take days to get in New York State, now can be obtained in seconds with the help of a computer miles away in Albany. Above, State Motor Vehicle Commissioner Vincent L. Tofany watches one of the new terminals in operation in New York City. Terminals eventually will be installed throughout the state.**

# Terminal System Provides Faster License Service

NEW YORK – A new State Motor Vehicle Department system in the New York Metropolitan area enables an individual who mislays his driver's license to obtain a duplicate – in moments – from a computer 150 miles away. Under the previous manual system of preparing duplicates, the driver would have to wait days or even weeks.

The system is the first to duplicate driver's licenses and to prepare license documents instantly by remote terminals, the department said. Its services also include amending licenses and issuing licenses to new residents who hold valid licenses from their former states.

Keyboard terminals have been installed in the department's New York City area offices. These terminals allow the metropolitan offices to use a central computer, an IBM 360/65, located at the department's headquarters in Albany. Telephone lines link the terminals directly to the computer and its files.

### Statewide System Planned

The installation represents the latest step in implementing a statewide, computer based system for driver licensing and vehicle registration. The terminals eventually will be used to issue new and duplicate vehicle registrations as well as license documents. It is expected that the new system will significantly reduce time spent by the public waiting in line at department offices.

The department receives approximately 700 to 1000 duplicate license requests daily throughout the state. About half of these are received in New York City area offices.

A total of 58 terminals will soon be in operation in the five boroughs of New York City, including 16 in Manhattan and 15 each in Queens and Brooklyn. By December 1969 the department plans to have about 270 terminals operating in 93 offices throughout the state.

### Paperwork Cut

A major benefit of the system, aside from convenience to the public, is the elimination of paperwork and slow, tedious file searching by motor vehicle personnel.

Under the new system, an individual seeking a duplicate license goes to a motor vehicle office. The clerk makes a note of the applicant's name, birth date, and sex and transmits this information through the keyboard of the IBM terminal to the central computer. At the same time, she places a blank license form in a special holder on the terminal.

### License Status Checked

The computer, upon receipt of the data, locates the applicant's record and checks to make sure the license has not been suspended or revoked. Then, under control of the computer, the new license is automatically printed on the form previously placed in the terminal.

But if a suspension or revocation has been noted in the applicant's record, the computer tells the operator through the terminal why the license is not issued. The operator tells the applicant the reason for the denial. It is then the applicant's responsiblity to satisfy the cause of his suspension or revocation.

If there is any doubt as to how the original license was made out – there may have been an error in the birth date, for example – the operator calls one of her counterparts in Albany. There, CRT terminals are used to display the records of all license holders with similar names. The correct listing can then be located and relayed to the [illegible]rk in New York, who revises the request to the computer. The visual terminals are also useful for fast response to law enforcement agencies requesting the status of individual license holders or vehicles.

# Weather Forces Simulated For Long-Range Forecasts

WASHINGTON, D.C. – The weatherman soon may be able to tell you two weeks ahead whether it will rain or shine on your vacation – and be right.

Using computers, experimental forecasts are being prepared by means of mathematical formulas which cover the interactions of the forces involved in the weather. One such formulation now under development may produce two week forecasts which will be as accurate as present two day predictions.

The Geophysical Fluid Dynamics Laboratory, part of the U.S. Department of Commerce's Environmental Science Services Administration (ESSA), performs dynamic experiments based on the formulas simulating the forces of the atmosphere and oceans. Massive amounts of processing are required. A 24 hour forecast involves the executing of about 10 billion instructions and about 14 hours of running time on a Univac 1108.

### Running a Test

One computer test, for instance, begins with data showing the wind at zero and all temperatures at a constant. Further inputs, equivalent to starting the earth rotating, turning on the sun, and activating all the physical processes in the atmosphere, are then added. The resulting general circulation is compared with actual atmospheric conditions.

Other experiments starting with real weather data have produced forecasts of wind flow, temperatures, and precipitation extending to 14 days.

"Using the mathematical models as the basis for computer programs, we have already obtained some useful weather information as far as two weeks ahead," comments R.D. Graham, executive assistant of the laboratory.

### Storms Forecast

In one case, Graham points out, the lab forecast the birth and development of three storms which developed successively at four day intervals off the coast of Texas and moved into the eastern third of the United States during a 12 day period.

"New and improved models now being tested hopefully will improve the accuracy of our forecasts," Graham adds. "We hope, after several more years of research and testing, to produce two week forecasts which will be as accurate as today's two day forecasts."

### Started With Eniac

Efforts of meteorologists to predict weather by mathematical models received a tremendous boost when the first electronic digital computer, Eniac, began to be used for weather research in the late 1940's. Using Eniac, a research group at the Institute for Advanced Study in Princeton, N.J. produced the first successful mathematical forecasts in 1949. This farsighted group was headed by the late Professor John von Neumann and Professor Jule Charney (now at the Massachusetts Institute of Technology).

Another study group, called the Joint Numerical Weather Prediction Unit, was then formed at Suitland, Md., the site of the Weather Bureau's National Analysis Center. During 1953 and 1954, this group developed 24 to 48 hour forecasts using the Princeton models. The maps produced by the computer were compared with maps prepared subjectively by meteorological experts. They proved to be just as accurate!

The early successes, mainly with charts depicting the flow of air at the 18,000 to 20,000 foot level of the atmosphere, led Professor von Neumann to recommend that a special research group be established at the Weather Bureau to further develop computerized long-range forecasting. Needed were much more extensive studies of all the factors involved in the general circulation of the atmosphere.

### Research Group Formed

In 1955, the forerunner of the Geophysical Fluid Dynamics Laboratory was established in the Weather Bureau under the direction of Dr. Joseph Smagorinsky, who had been one of the young scientists working with von Neumann and Charney at Princeton. The research plan of this group, to establish general circulation models for tests and experiments, is still being used today.

The Geophysical Fluid Dynamics Laboratory moves this fall from Washington, D.C. to Princeton, N.J., where it will continue its computerized weather experiments. The laboratory is a department of the Environmental Science Services Administration's Research Laboratories, headquartered in Boulder, Colo.

# 'Seek Dawn' System Directs Air Support

HANSCOM FIELD, Mass. – Project Seek Dawn, developed by the Air Force Systems Command's Electronic Systems Division, will provide a computerized electronic system to monitor and direct tactical air operations in Southeast Asia. The system will work in conjunction with semiautomatic systems developed and operated by the Marines and Navy.

The Seek Dawn system is similar to the Back-Up Interceptor Control (BUIC) System currently deployed for the defense of North America against air attack. Seek Dawn uses a modified version with added operational features and conversion of geographic data to fit the Southeast Asia operational environment. Seek Dawn furnishes a sophisticated proven system for the surveillance of aircraft over a broad geographic area with a high degree of accuracy and reliability.

Seek Dawn consists of two facilities, one in Vietnam and a second system located in Thailand. A digital data link will provide for the exchange of tactical information between the two locations. The system uses high speed electronic computers to process flight plans and check aircraft routes by radar tracking. The information is presented to operator personnel on display scopes in the form of numerical, alphabetical, and pictorial symbols.

Project contracts were awarded to the Philco-Ford Corp. for facility design, site construction, maintenance, and communications; to the System Development Corp. for the computer programs and system testing; and to the Burroughs Corp. for installation and assembly of the modified radar data processors and electronic computers. The Mitre Corp. provided system engineering.

## *Fighting Old Man River*

# Computer Aids Flood Control Projects

FORT WORTH, Texas – The U.S. Department of Agriculture has turned to a computer for help in controlling damaging floods in the 11 southern states, Virgin Islands, and Puerto Rico.

The Soil Conservation Service has installed an IBM 1130 in its Fort Worth office to help plan watershed and river basin structures built to control water runoff in areas of chronic flooding.

Currently the IBM system is helping plan and design a major flood prevention project in the Big Sandy watershed which extends from Bowie to Fort Worth.

### Routing Flood Water

Conservation teams are developing a system to route flood waters through Big Sandy's maze of 50 retarding dams. The flood water must pass through the retarding dams and flow into the Trinity River within 10 days after a severe storm to prevent flood damage. The computer produced plan is being reviewed by local conservation groups prior to submission to Congress for funding.

The service's south regional branch is currently assisting in more than 100 flood prevention projects on upstream watersheds and has been asked to help with more than 300 other projects.

The computer is also helping design both large and small farm irrigation systems. It determines the amount of water needed to irrigate a given acreage and helps select the best design for an irrigation project.

The time that is saved frees engineers, hydrologists, economists, and other technical specialists from burdensome desk work and enables them to gather better information on problem areas.

# IBM Estimates IMS/360 Performance

WHITE PLAINS, N.Y. – IBM has released performance estimates for its new Information Management System/360, which show that it can handle between three and six messages a second, and can provide a response time of a minute or less. The typical hardware would include a 524K System 360 with 10 tapes, two 2314s, and up to 62 terminals.

The software system is file centered. The basic data base files are held on the IBM 2314 disk drives and the software is used both for updating the files and for inquiry purposes through the terminals. Batched processing can take place to handle reports.

The various application programs can be written in PL/1, Cobol, or assembler languages and jump to a special language, Data Language/1, for handling input/output functions such as referencing, inserting, updating, and deleting records (called segments). The access methods include either sequential operations (Get Next) or random operations (Get Unique). The use of these techniques allows the physical reorganization of existing data bases without modification to application programs.

### Security Precautions

The security of the data base is maintained by the message scheduler. All valid messages are predefined, and include a code of one to eight characters which is verified before processing commences.

Processing then takes place on a message priority basis. The priority system consists of allocating a Limit Priority and a Limit Count to each message type. The number of messages currently waiting action is tested against the Limit Count, and if it exceeds the count, then the message priority is automatically bumped up to the Limit Priority. Turnaround time guarantees are related to minimum message traffic.

IBM gives an example of this action, assuming that an application requires a one hour turnaround on all messages. Based on a message type, MTI, which had a Limit Count of 20, and a minimum message frequency of 25 an hour, a priority of 4 might well be sufficient to ensure that it received attention every 15 minutes. However, during peak loading times on the system, it might be necessary to up its priority to 11 to get proper treatment. As 25 messages will be received in any hour, then a failure to provide frequent service will be noticed within 20/25ths of an hour, or 48 minutes – and will give rise to the upping of the priority, which hopefully will be sufficient to provide the servicing in time.

## Sample Application Illustrates How IMS/360 Works

### IMS/360 Sample Application

The sample application considered for the IMS/360 environment is a production order location and status reporting system. This example is based on a system designed for installation at North American Rockwell Corp. Space Division. This application system provides manufacturing personnel with a means of locating, providing status, and monitoring manufacturing orders in the shop from the date of issuance until the manufacturing order is closed out. This application system provides manufacturing management and shop supervision with accurate, comprehensive reports and information concerning location, schedule visibility, and status condition. This is done by providing for a wide range of work orders, expanding and modifying currently available reports, and providing for teleprocessing data collection and reporting.

This application sample outlines the input/output methodology and the application design. The structure of the data bases and the message formats are application oriented within the constraints of IMS/360.

### Application Data Base Structure

Three data bases are required. First is the manufacturing order data base, which contains a record for each manufacturing order. It is a two level, hierarchical structure containing the variable or top portion of a manufacturing order and the last reported status of the order in the root segment level. The first level dependent segments contain records of all status transactions other than the last reported for that order. The last reported status is being kept in the root segment because it is the only status required for batch processing. Placing it here eliminates the need for accessing the first level dependant segments during the batch reporting.

The second is the part number cross reference base, which relates a part number to all open manufacturing orders for that particular part.

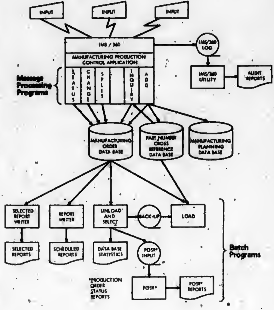
The third is the manufacturing planning data base, which contains a record for each manufacturing order that has been planned and that will be released to the shop floor for work.

### Message Types

In addition, there are five message processing programs which provide the data all for this application system. These are the Add program, which adds new manufacturing orders; the Change program, which changes existing manufacturing work orders; the Status program, which allows the shop to report the progress of parts as they flow to various operations within manufacturing; the Split program, which splits an existing manufacturing order; and the Inquiry program, which handles the processing of inquiries in both the teleprocessing and the batch environment.

Six programs select and format reports in the batch environment:

- The Report Writer program selects and formats the regularly produced reports on a periodic basis.
- The Unload and Select program unloads the manufacturing order data base on a periodic basis and selects the applicable records for subsequent reports.
- The Load program unloads/reloads the manufacturing order data base, eliminating the overflow and any deleted data base records.
- The Production Order Status Report program.
- The Selected Report Writer program allows manufacturing personnel to vary the range and sorting sequence of 18 types of reports. For example, manufacturing may request a part number report for a specific department and for a specific model and unit and receive only the manufacturing order numbers which apply to those criteria.
- The IMS/Log Report Writer, which produces various counts of the messages and message types, allowing manufacturing to audit terminal usage, department participation, and file maintenance.



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# Lack of Program Managing Can Cause Economic Loss

LAS VEGAS, Nev. – "It seems clear," said George F. Weinwurm, "that in nearly every part of our field a great many people have committed themselves to information processing only to 'crash in economic flames.'

"The lack of a general methodology for managing computer programming in an economic sense results in both program producers and users losing enormous amounts of money," he said.

Weinwurm, a technical advisor to management, Corporate Planning Staff, System Development Corp., will chair an all day session on economical programming at the ACM conference here Aug. 28.

"It becomes increasingly obvious," he said, "that the full potential of information processing will not and cannot be realized until computers and their applications can be managed reliably in an economic sense."

Weinwurm also noted the lack of data regarding the economics of computer program production and the very limited way in which differing opinions are discussed through the journals and societies. "For the most part," he said, "the hundreds, if not thousands, of panel discussions, tutorials, and articles on the subject during the last 10 years have been on a transparently superficial, and often amateurish level.

"It is time," he said, "that the economic management of computer programming be brought into the mainstream of professional discussion by responsible people whose contentions are supported by facts instead of assertions. That is what the session will aim to elicit."

The session will start at 9 a.m. and last until 6 p.m. Nine information processing experts, representing industry and government, will discuss the subject in three subsessions.

## Society Forms Computer Section

CHICAGO – "Cost cutting in the operation of third generation computer systems will be the goal of the new Computer Manager's Section of the National Society of Controllers and Financial Officers of Savings Institutions," according to Robert E. Downie, president of the society.

Chairman of the section is James R. Tabor, vice president, Des Moines Savings and Loan Association, Des Moines, Iowa. Only three persons from any one savings institution service center may be members of the section.

# New ACM Head Appoints Opponent And Others to Various Committees

NEW YORK – A number of ACM committee appointments have been announced by the new president, Dr. Bernard Galler, including the appointments of his opponent in the recent elections and of others who did not win election. Richard Canning, runner-up for the presidency, has been put in charge of the professional development committee; Jean Sammett, who ran for the northeast regional council membership, is in charge of the committee for special interest groups; and Jack Minker, who ran for the council from Washington, D.C., is in charge of the Program Committee. Dr. Minker held a similar position for the 1967 ACM Annual Conference in Washington last year.

### Committees Dissolved

At the same time, a number of committees have been dissolved, including those on ACM-DPMA relations, on programming languages, and on aims and objectives.

## calendar

Aug. 27-29, Las Vegas, Nev. – ACM National Conference & Exposition. Contact Richard B. Blue, Sr., TRW Systems Group, Bldg. R3, Room 1144, 1 Space Park, Redondo Beach, Calif. 90278.

Sept. 9-11, Washington, D.C. – Electronics & Aerospace Systems Convention (EASCON). Contact Mrs. Harriet H. Manley, Page Communications Engineers, Inc., 3300 Whitehaven St., N.W., Washington, D.C.

Sept. 9-13, Houston, Texas – Joint Fall Conference Univac Users Assn. & Scientific Exchange. Contact Robert H. Beaton, Neisner Bros., Inc., 49 East Ave., Rochester, N.Y.

Sept. 11, Hawthorne, Calif. – ACM/Sigspace Seminar. Contact Carolee M. Krueger, ACM, P.O. Box 90698, Los Angeles, Calif. 90009.

Sept. 20, Chicago, Ill. – Systems and Procedures Association seminar. Contact Robert Renier, Harris Trust & Savings Bank, 111 W. Monroe St., Chicago, Ill. 60690.

Oct. 3-4, Buffalo, N.Y. – Second Annual Sigplan PL/1 Forum. Contact Dr. Robert F. Rosin, Computer Science Dept., SUNY, 4250 Ridge Lea Rd., Amherst, N.Y. 14226.

Oct. 10-12, Overland Park, Kans. – DPMA Division 4 Fall Conference. Contact DPMA Kansas City Chapter, P.O. Box 2425, Kansas City, Mo. 64142.

Oct. 14-16, New Orleans, La. – Fourth Annual Meeting Echo (Electronic Computing Hospital Oriented). Contact Richard A. Crenshaw, Director of DP, Hillcrest Medical Center, 1120 S. Utica Ave., Tulsa, Okla. 74104.

Oct. 20-23, St. Louis, Mo. – 1968 International EDP Conference. Contact SPA, 24587 Bagley Rd., Cleveland, Ohio 44138.

Nov. 21-22, New York, N.Y. – 1968 DPMA Division 13 Data Processing Conference. Contact John J. Wilk, Union Carbide Corp., 270 Park Ave., New York, N.Y. 10017.

# COMPUTERWORLD financial

## Earnings Reports

### COMPUTER SCIENCES

LOS ANGELES, Calif. – Computer Sciences Corp. has reported net earnings of $980,000 ($.21 per share) on record revenues of $14,435,000 for the first fiscal quarter ended June 28, up from net earnings of $725,000 ($.17 per share) on revênues of $11,947,000 for the same period last year.

### DATAMATION SERVICES

NEW YORK – Datamation Services, Inc.'s earnings for the six months ended June 30 increased 56% to $156,000 ($.31 per share) on revenues up 21% to $2,040,000, the company said.

### NCR

NEW YORK – National Cash Register Co. has announced increased income for the first six calendar months of $483,444,625, up from $440,702,578 for the same period in 1967, and increased earnings for the period of $12,941,279 ($1.45 per share), up from $12,558,353 ($1.41 per share).

### DPA

DALLAS, Texas – DPA, Inc. has reported net earnings of $217,829 ($.12 per share) on income of $4,120,295 for the first fiscal half ended May 31, up from last year's first half earnings of $133,770 ($.11 per share) on income of $3,479,105.

### SDS

LOS ANGELES, Calif. – Scientific Data Systems, Inc. has achieved record sales of $45,747,000 for the first half of 1968, up 43% over the similar period last year, and record after tax earnings of $4,070,000 ($.67 per share), up from $2,760,000 ($.52 per share), the company said.

## NYSE Gives SEC Counter Proposal on Brokers Fees

NEW YORK – The New York Stock Exchange has submitted to the Securities and Exchange Commission a counter proposal for reducing its commission rate structure on volume stock transactions. The SEC has requested the NYSE to make far-reaching interim changes by Sept. 15.

The NYSE plan would provide for volume discounts on round lot securities transactions involving more than 1000 shares, but would not affect transactions of 1000 shares or less.

On sales involving commissions of more than $100,000, the plan would permit negotiated commissions provided that the negotiated commissions are not less than $100,000.

NYSE President Robert W. Haack indicated that the plan would reduce commission income for member firms of the exchange by about $150 million.

### "Give Up" Ban Suggested

The proposal also suggests a prohibition of customer directed "give ups" and an across the board reduction by about 7% of floor brokerage and clearance charges between exchange members.

"Give ups," an industry wide practice whereby large customers order brokers to give part of their sales commissions to others, has been under criticism by both the SEC and the Justice Department. When first suggested, the exchange did not favor abolishing "give ups."

The SEC has contended that a broker's willingness to give up part of his commission means that the existing rate structure is too high.

### Reaction Mixed

The discount proposal has generally been supported by member firms with large retail business and opposed by those with large institutional business. The SEC had not commented on the plan publicly as *Computerworld* went to press, but one SEC official said that he thought the plan "reasonable."

Institutional brokers claim that their costs are high even on large block transactions, that a higher percentage of their expenses go for research services to institutional investors than is the case for firms dealing in smaller volumes for many individuals, and that they are being asked to carry the major burden of the reduced rates.

Adoption of the plan requires both SEC approval and an amendment to the exchange constitution. To approve an amendment, a majority of the exchange's 1366 members must be in favor, with at least 684 members voting.

Comparison of the commission charges under present and proposed rate structures for blocks of 2000 shares on representative transactions are shown below. Stocks selling for $90 or more a share are not affected.

| Price Per Share | Commission — Current | Proposed |
|---|---|---|
| $ 15 | $440 | $335 |
| 30 | 680 | 520 |
| 50 | 880 | 720 |
| 100 | 980 | 980 |

## Acquisitions

### Control Data Bids For EDP Forms Firm

MINNEAPOLIS, Minn. – Control Data Corp. has completed negotiations to acquire American Business Systems, Inc. of Philadelphia, a manufacturer of continuous forms and punched cards for use in data processing equipment, through a tax free exchange of Control Data common stock valued at $5,153,436.

In making the announcement, the two companies noted that the terms of the acquisition were in the preliminary stage and that the proposal is subject to the completion of a definitive agreement as well as the approval of the directors of both companies and the stockholders of American Business Systems.

Consolidated Foods Corp. of Chicago, Ill., which owns approximately 60% of American Business System's outstanding common stock, has stated that, subject to the definitive agreement, it will vote in favor of the acquisition.

### Computing and Software Acquires 3 Companies

PANORAMA CITY, Calif. – Computing and Software, Inc. has acquired Selective Office Services, Inc. and Selective Data Processing, Inc., both California based companies involved in the sale of data preparation and conversion to both commercial and governmental organizations throughout the state, for an undisclosed amount of a new convertible preferred stock.

Wesley Colbert, former executive vice president of both organizations, will function as president of the new Computing and Software subsidiary, the announcement said.

Computing and Software also has completed a merger with American Mailing Corp. of Alexandria, Va., specialists in direct mail services, for undisclosed terms.

Computing and Software develops computer software and provides technical training in the data processing field.

### Moving Company Bought By Strategic Data

NEW YORK – S. Santini Transport, Inc., a company that moves computers and related peripheral equipment, has been acquired by Strategic Data Transport, Inc., a subsidiary of Strategic Systems, Inc. The announcement did not disclose the terms.

### Tape Service Company Bought by MACS

PHILADELPHIA – Management and Computer Services, Inc. has disclosed the acquisition of the Tape Service Co. of Philadelphia, a tape sales and rehabilitation firm, for undisclosed terms.

### DPA Completes Merger With Pioneer Texas Corp.

DALLAS, Texas – DPA, Inc., a lessor of computers and other data processing equipment, has completed a merger with Pioneer Texas Corp., a distributor of specialized lubricants and, through a subsidiary, a manufacturer of school book covers.

The transaction will involve the issuance of approximately 133,000 shares of new DPA $1.60 convertible preferred stock with Pioneer stockholders receiving 0.4 a share of the preferred for each Pioneer common share held, the announcement said.

### Digitek Corp. Agrees to Buy Application Research Corp.

LOS ANGELES, Calif. – Digitek Corp. has agreed to acquire, on a pooling of interests basis, Application Research Corp., a six year old computer software and engineering, research, and development firm, also located here, for 182,130 shares of common stock.

The acquisition would increase Digitek's sales by about 60%, the announcement indicated.

Digitek, which had sales of about $1.6 million for the year ended May 31, is engaged in the development and implementation of computer software systems.

### Brandon Buys Journal

PRINCETON, N.J. – Brandon/Systems Press, a subsidiary of Brandon Applied Systems, Inc., has announced the acquisition of *Computer Operations*, a quarterly journal for senior business executives responsible for developing and directing computer operations. Terms were not disclosed.

### Two Georgia Firms Merge

ATLANTA, Ga. – Computer Center of Atlanta has announced the purchase of the business and assets of Computer Services Corp., also of Atlanta, for an undisclosed price.

CCA is an affiliate of Computer Center Inc. in Palm Beach, Fla.

## *Wall Street's View*

AMPEX – Francis I. DuPont & Co. recently labeled the stock as consistent growth for the long range investor.

BURROUGHS – Filor, Bullard & Smyth says a break below 190 would turn the stock bearish. Bache & Co. recommends trading accouts sell, as the closing below the 193-195 level completed a top pattern.

COLLINS RADIO – Bache & Co. says to avoid the stock for the intermediate term while it is in its down trend.

CONTROL DATA – C.B. Richard, Ellis & Co. says that it believes a major top is being formed and would be tempted to avoid it until a more clear cut pattern can develop.

GENERAL ELECTRIC – Francis I. DuPont & Co. recently rated the stock as consistent growth for the long range investor, and says that the computer division, long a drain on earnings, is expected to show reduced losses this year and make a worthwhile contribution to growth in future years.

IBM – Bache & Co. says to buy on weakness, keeping in mind that the close below 340 was unfavorable.

RCA – Gude, Winmill & Co. says that selling around 45, the stock seems attractive for purchase.

RAYTHEON – Filor, Bullard & Smyth recommends avoiding the stock for the intermediate term. However, in issuing a revised research report that lists downward projected sales, Harris, Upham & Co. states that the stock represents good value at current levels, revises its previous "hold" rating into a "buy." recommendation, and suggests that accumulation programs can be instituted.

SANDERS ASSOCIATES – Hayden, Stone, Inc. says that in spite of the stock's up and down fluctuations, the company has made steady progress in its highly sophisticated and reputed electronic specialties.

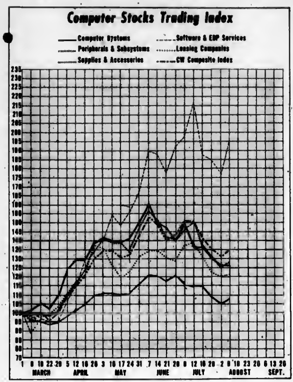
SPERRY RAND – Bache & Co. recommends the current dip below 50 as a buying opportunity. Reynolds & Co. says that the stock could pay $2.25 for the full year, and despite breaking through a support level recently, would recommend holding it.

## BUY ★ SELL ★ SWAP

IBM Data Cells (new)
Qty. 1-50
$350.000/each
Data Cell Cart (2)
$150.00/each
Contact: Norman R. Briggs
Stanford Computation Center
Stanford University
Stanford, California 94305
(415) 321-2300 ext. 4372

WE WILL SOLVE YOUR KEYPUNCHING PROBLEMS
FOR $4.50 PER HOUR
+ Pickup and delivery service
+ Quick turnaround service
KEYPUNCH CORP.
120 Boylston Street
Boston–Telephone 426-6966

A.G.O. Keypunching Service, Inc.,
for large or small volume. Recurring and 1 time assignments.
Reasonable Rates
Service accurate and dependable
Open 7 days 24 hrs. per day
Call G. Ormond
(212) 658-4328



# CW Stock Average Closes Up 3% at 135

*Computerworld's* Composite Stock Index closed Aug. 9 at 135, up 4 points, or 3%, in a market that saw general improvement over previous weeks.

Three leading market indicators all closed up: the New York Stock Exchange Composite average, at 54.46, up 0.28; the American Stock Exchange price index, $27.96, up $.44; and the Standard & Poor's industrial average, 105.51, up 0.44. In contrast, the Dow-Jones industrial average closed down 1.62 points, or 0.19%, at 869.63.

Among the *Computerworld* listed stocks, gainers outnumbered losers for the first time in four weeks.

Volume for the week on the New York Stock Exchange was 39,796,102 shares, down from the previous week's 45,422,450 shares. Trading was at its slowest pace in four months.

Among the week's most active stocks on the New York Stock Exchange were Sperry Rand, 8th, up 2.03% to 44 on 274,000 shares traded, and Bunker Ramo, 14th, up 1.53% to 16-5/8 on 211,000 shares traded.

### New Highs, Lows

Among the *Computerworld* listed stocks, two issues closed at new highs for the year and three issues at new lows.

Closing at new highs were National Computer Analysts, 61, up 4.52%, and Computer Exchange, 13-1/2, up 14,89%.

Closing at new lows were Collins Radio, 54-1/8, down 0.69%; General Electric, 81-1/2, off 1.95%; and Matrix Corp., 14-1/2, down 3.33%. General Electric was at a new low for the third consecutive week.

Of the *Computerworld* listed stocks, 55 issues advanced, 31 declined, and nine remained unchanged. The previous week, 24 advanced, 69 declined, and three remained unchanged.

Overall on the New York Stock Exchange, 960 issues advanced, 577 declined, and 316 were unchanged, versus the previous week's score of 466 advances, 1084 declines, and 132 unchanged.

### CW Indexes Mixed

The five *Computerworld* stock sector indexes showed mixed action, with three up and two down, as opposed to the previous three consecutive weeks in which the indexes were all down.

The Software & EDP Services index, up 17 points, or 9.5%, to 195, was mainly responsible for the rise in the *Computerworld* composite index to 135.

The Computer Systems index closed at 126, down 1 point, or 0.8%; the Peripherals & Subsystems index, 128, up 3, or 2.4%; the Supplies & Accessories index, 103, down 2, or 1.9%; and the Leasing index, 121, up 1, or 0.8%.

### Trading Commentary

When the market opened for the week Aug. 5, prices generally took a swing upward in technical rallies that showed the Dow-Jones industrial average up and gainers outnumbering losers. Computers were among the groups that were up in a day of trading that was the lowest in volume since March 28.

Tuesday, trading volume increased slightly but remained light with computer stocks again among the gainers, and the Dow-Jones average again closed up.

When the market reopened Thursday the upward trend soon ran out of steam and stocks, including those in the computer group, generally fell. Volume was up from the level Tuesday, but was the lowest Thursday since the Wednesday closings were begun June 12.

# COMPUTER STOCKS: TRADING SUMMARY

| EXCHANGE | BASE PRICE 3-1-68 | 1968 RANGE | CLOSING PRICE | COMPUTER SYSTEMS | WEEK NET CHANGE | WEEK % CHANGE | % CHANGE FROM BASE |
|---|---|---|---|---|---|---|---|
| NYSE | 163 3/8 | 220–167 | 197 1/2 | *Burroughs | + 4 7/8 | + 2.53 | + 20.86 |
| NYSE | 67 3/4 | 110– 54 | 54 1/4 | Collins Radio | − 3/8 | − 0.69 | − 20.11 |
| NYSE | 101 1/2 | 174– 95 | 149 1/4 | *Control Data | + 7 1/4 | + 5.11 | + 47.04 |
| AMSE | 102 | 160– 95 | 142 | *Digital Equipment | + 10 1/2 | + 7.92 | + 40.20 |
| NYSE | 87 1/4 | 100– 81 | 81 1/2 | General Electric | − 1 5/8 | − 1.95 | − 6.59 |
| NYSE | 58 | 91– 55 | 75 5/8 | Hewlett-Packard | + 1 5/8 | + 2.19 | + 28.94 |
| NYSE | 93 1/8 | 144– 88 | 117 5/8 | *Honeywell | + 5 1/8 | + 4.56 | + 26.31 |
| NYSE | 296 1/2 | 375–280 | 344 | *IBM | − 1 | − 0.29 | + 16.11 |
| NYSE | 103 7/8 | 163– 99 | 126 1/2 | *National Cash Register | + 5/8 | + 0.50 | + 21.79 |
| NYSE | 46 7/8 | 55– 44 | 45 7/8 | RCA | + 1 1/8 | + 2.51 | − 2.14 |
| NYSE | 39 1/8 | 53– 34 | 35 1/2 | Raytheon | + 1/4 | + 0.70 | − 9.27 |
| OTC | 22 1/2 | 66– 20 | 42 | *Scientific Controls Corp. | + 2 | + 5.00 | + 86.67 |
| NYSE | 78 3/4 | 114– 72 | 88 | *Scientific Data | − 1 1/8 | − 1.25 | + 12.06 |
| NYSE | 45 | 63– 42 | 44 | *Sperry Rand | + 7/8 | + 2.03 | − 2.22 |
| AMSE | 22 1/2 | 39– 20 | 21 1/2 | *Systems Engineering Labs. | + 5/8 | + 2.99 | + 40.00 |

| EXCHANGE | BASE PRICE 3-1-68 | 1968 RANGE | CLOSING PRICE | PERIPHERALS & SUBSYSTEMS | WEEK NET CHANGE | WEEK % CHANGE | % CHANGE FROM BASE |
|---|---|---|---|---|---|---|---|
| NYSE | 58 3/8 | 81– 52 | 74 1/2 | Addressograph-Multigraph | + 1 3/4 | + 2.47 | + 27.62 |
| OTC | 21 | 60– 40 | 58 1/2 | Alphanumeric | − 1/2 | − 0.85 | +178.57 |
| NYSE | 29 | 37– 25 | 36 | Ampex | + 3/4 | + 2.08 | — |
| OTC | 17 1/4 | 27– 19 | 17 1/4 | Bolt, Beranek & Newman, Inc. | — | — | — |
| NYSE | 13 1/2 | 20– 12 | 16 5/8 | Bunker-Ramo | + 1/4 | + 1.53 | + 23.10 |
| AMSE | 32 1/4 | 50– 27 | 37 | *Calcomp | + 1/2 | + 1.37 | + 15.19 |
| OTC | 24 1/2 | 49– 20 | 49 | *Cognitronics | + 6 | + 13.95 | +100.00 |
| OTC | 12 | 17– 12 | 14 | Computer Equipment | + 1/8 | + 0.90 | + 16.66 |
| OTC | 15 1/4 | 23– 13 | 17 3/4 | *Data Products | + 2 1/8 | + 13.60 | + 16.39 |
| OTC | 10 1/4 | 27– 10 | 10 1/4 | *Digitronics | + 3/4 | + 4.05 | — |
| OTC | 38 | 67– 33 | 37 1/2 | *Electronic Memories | − 3 | [illegible] | − 1.32 |
| OTC | 10 | 20– 8 | 14 1/8 | *Fabri-Tek | − 1/8 | − 12.39 | + 41.25 |
| OTC | 34 | 71– 38 | 54 | Gerber Scientific | − 3 | − 3.57 | + 58.81 |
| OTC | 12 1/2 | 28– 10 | 21 1/2 | Information Displays | — | — | + 72.00 |
| AMSE | 10 7/4 | 52– 14 | 34 | Milgo Electronics | + 3/4 | + 2.25 | +181.48 |
| AMSE | 57 1/2 | 108– 54 | 83 | *Mohawk Data Sciences | + 1/2 | + 0.60 | + 44.34 |
| OTC | 74 | 138– 71 | 94 | *Optical Scanning Corp. | − 6 | − 6.00 | + 27.02 |
| OTC | 16 | 42– 16 | 26 3/4 | Photon | − 1/4 | − 0.87 | + 69.72 |
| AMSE | 25 5/8 | 38– 20 | 22 7/8 | *Potter Instrument | + 3/4 | + 2.67 | + 12.68 |
| OTC | 40 1/4 | 90– 38 | 85 | *Recognition Equipment Corp. | + 1 1/2 | + 1.80 | +111.18 |
| AMSE | 16 | 29– 14 | 21 3/8 | Rixon Electronics | + 5/8 | + 3.01 | + 33.59 |
| NYSE | 40 1/4 | 60– 42 | 45 3/8 | Sanders | + 1 1/2 | + 3.34 | + 5.42 |
| OTC | 47 | 105– 83 | 95 | Scan-Data | + 6 | + 6.89 | +102.12 |
| OTC | 40 1/2 | 61– 35 | 46 | *Tally Corp. | + 1 1/2 | + 3.37 | + 12.38 |
| NYSE | 242 1/4 | 321–229 | 277 1/4 | Xerox | +10 1/4 | + 3.84 | + 14.44 |

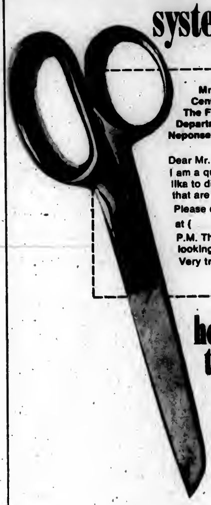
| EXCHANGE | BASE PRICE 3-1-68 | 1968 RANGE | CLOSING PRICE | SUPPLIES & ACCESSORIES | WEEK NET CHANGE | WEEK % CHANGE | % CHANGE FROM BASE |
|---|---|---|---|---|---|---|---|
| OTC | 64– 37 | 40 1/2 | 42 1/2 | *Acme Visible | + 5 1/2 | + 14.86 | − 12.33 |
| NYSE | 53– 16 | 50 1/2 | 50 3/8 | Adams-Millis | − 1/4 | − 1.23 | − 0.61 |
| OTC | 21– 13 | 13 5/8 | 18 3/4 | *Baltimore Business Forms | − 1/4 | − 1.33 | + 37.61 |
| AMSE | 44– 21 | 27 | 29 1/4 | *Barry Wright | — | — | + 7.87 |
| OTC | 40– 26 | 31 1/4 | 35 | Data Documents | − 1/4 | − 0.71 | + 12.00 |
| OTC | 29– 16 | 27 1/4 | 21 1/2 | *Ennis Business Forms | − 3 | − 8.86 | + 16.09 |
| NYSE | 110– 81 | 54 1/8 | 100 | *3M Company | — | — | + 16.87 |
| NYSE | 83– 49 | 58 | 73 | *Memorex | + 3 3/4 | + 5.42 | + 25.86 |
| OTC | 32– 16 | 27 1/4 | 29 1/2 | *Moore Business Forms | − 1/8 | − 0.42 | + 8.25 |
| NYSE | 76– 47 | 57 1/4 | 70 3/8 | Nashua Corp. | − 1/4 | − 0.53 | + 21.00 |
| OTC | 66– 30 | 31 1/4 | 47 1/2 | Reynolds & Reynolds | − 1 1/2 | − 2.06 | + 52.00 |
| OTC | 30– 24 | 34 1/2 | 24 | *Standard Register | − 1/2 | − 2.04 | − 30.43 |
| NYSE | 44– 30 | 37 3/4 | 31 1/2 | *Uarco | + 1 | + 3.17 | − 16.56 |
| AMSE | 22– 13 | 14 1/4 | 16 3/4 | Wabash Magnetics | + 1/4 | − 1.50 | + 17.54 |
| OTC | 38– 24 | 25 3/4 | 28 | *Wallace Business Forms | + 1 | − 3.70 | + 8.73 |

| EXCHANGE | BASE PRICE 3-1-68 | 1968 RANGE | CLOSING PRICE | SOFTWARE & EDP SERVICES | WEEK NET CHANGE | WEEK % CHANGE | % CHANGE FROM BASE |
|---|---|---|---|---|---|---|---|
| OTC | 7 1/2 | 25– 7 | 17 | Advanced Computer Techniques | — | +142.86 | — |
| OTC | 17 | 30– 14 | 27 | *Applied Data Research | — | + 28.88 | — |
| OTC | 10 1/2 | 24– 10 | 19 | *Aries | + 15.10 | + 28.88 | + 2 1/2 |
| AMSE | 47 | 60– 45 | 50 1/8 | Automatic Data Processing | + 6.66 | + 6.66 | − 3 1/8 |
| OTC | 4 | 19– 4 | 13 | Automation Sciences | — | +225.00 | — |
| OTC | 4 1/2 | 20– 3 | 15 | *Brandon Applied Systems | + 6.67 | +233.33 | + 1 |
| AMSE | 22 7/8 | 43– 21 | 22 1/2 | Computer Applications | − 2.17 | − 1.64 | − 1/2 |
| OTC | 5 | 13– 7 | 11 1/2 | Computer Environments | − 4.17 | +130.00 | − 1/2 |
| OTC | 30 | 50– 24 | 47 | Computer Network | + 6.82 | + 56.61 | + 2 |
| AMSE | 40 | 64– 36 | 47 7/4 | *Computer Sciences | + 2.61 | + 19.06 | + 1/8 |
| OTC | 39 | 62– 23 | 29 1/2 | *Computer Usage | — | − 24.36 | — |
| AMSE | 36 1/2 | 61– 36 | 53 7/8 | *Computing & Software | + 2.19 | + 47.60 | + 1 1/8 |
| OTC | ** | ** | ** | Comshare | ** | ** | ** |
| OTC | 12 1/2 | 22– 10 | 20 1/2 | Documentation Services | + 4.44 | + 66.00 | + 1 |
| OTC | 12 1/2 | 20– 8 | 14 1/2 | *Digitek | − 1.69 | + 16.00 | − 1/4 |
| AMSE | 38 3/8 | 99– 30 | 38 | Electronic Computer Prog. Inst. | − 15.44 | − 24.40 | − 7 |
| OTC | 35 | 66– 33 | 61 | *Informatics | + 1.83 | + 74.29 | + 1 |
| OTC | 21 | 26– 14 | 14 1/2 | Matrix Corp. | − 3.33 | − 30.95 | − 1/2 |
| OTC | 11 1/2 | 61– 5 | 61 | *National Computer Analysts | + 4.52 | +430.43 | + 10 |
| AMSE | 31 | 45– 36 | 38 5/8 | Planning Research | + 8.70 | + 24.60 | + 2 5/8 |
| OTC | 9 | 15– 5 | 11 3/4 | Software Systems | + 10.64 | + 30.55 | + 1 1/4 |
| OTC | 20 1/2 | 22– 12 | 12 1/2 | TBS Computing Centers, Inc. | — | − 34.10 | — |
| OTC | 63 | 157– 57 | 130 | *University Computing | — | +106.35 | — |

| EXCHANGE | BASE PRICE 3-1-68 | 1968 RANGE | CLOSING PRICE | LEASING COMPANIES | WEEK NET CHANGE | WEEK % CHANGE | % CHANGE FROM BASE |
|---|---|---|---|---|---|---|---|
| OTC | 10 | 67– 10 | 42 | Boothe Computer | − 4 | − 8.69 | +[illegible] |
| OTC | 16 1/4 | 28– 10 | 26 3/4 | Chandler Leasing | + 3/4 | + 2.88 | + 38.76 |
| OTC | 4 1/4 | 18– 4 | 13 1/2 | Computer Exchange | + 1 3/4 | + 14.89 | +217.65 |
| AMSE | 30 1/8 | 36– 21 | 33 | *Computer Leasing | + 1 5/8 | + 5.16 | + 11.40 |
| OTC | 12 1/4 | 16– 11 | 13 1/4 | *Cyber-Tronics | − 1/8 | − 0.93 | + 8.16 |
| AMSE | 106 5/8 | 124– 94 | 108 7/8 | *Data Proc. Financial & General | + 2 3/8 | + 2.23 | + 2.11 |
| OTC | 12 1/2 | 17– 8 | 8 1/2 | Detronic Rental | + 1/4 | + 2.70 | − 24.00 |
| OTC | 20 | 50– 10 | 47 | Dearborn Computer | + 2 | + 4.44 | +135.00 |
| OTC | 13 1/4 | 19– 12 | 17 1/8 | *DPA, Inc. | − 1/4 | − 1.44 | + 29.25 |
| AMSE | 30 3/4 | 43– 27 | 30 1/4 | *Greyhound Computer | + 1/4 | + 0.83 | + 8.20 |
| AMSE | 30 1/8 | 69– 30 | 58 1/4 | Granite Equipment Leasing | + 4 1/4 | + 6.60 | + 93.70 |
| AMSE | 40 | 94– 41 | 68 1/8 | *Leasco | − 6 3/8 | − 2.45 | + 70.60 |
| OTC | 5 | 14– 5 | 5 1/8 | Levin-Townsend Computer Leasing | + 3/4 | + 6.97 | + 69.00 |
| AMSE | 38 3/8 | 99– 27 | 65 3/8 | *Levin-Townsend Computer Corp. | − 1/2 | − 0.65 | + 70.38 |
| OTC | 19 1/2 | 19– 7 | 8 | *LMC Data, Inc. | − 1/4 | − 2.70 | − 14.28 |
| OTC | 10 7/4 | 19– 10 | 15 5/8 | *Management Assistance | — | — | − 2.28 |
| AMSE | 41 5/8 | 53– 38 | 34 3/4 | National Equip. Rental | + 3/4 | + 2.21 | − 16.52 |
| AMSE | 38 | 64– 30 | 44 1/2 | *Randolph Computer Corp. | + 2 1/2 | + 5.95 | + 17.11 |
| OTC | 10 1/2 | 42– 10 | 33 | System Capital Corp. | + 1/4 | + 0.76 | +214.28 |
| AMSE | 10 7/8 | 19– 10 | 10 3/4 | U.S. Leasing | + 1/8 | + 0.80 | + 44.62 |

*Companies included in Computerworld's stock trading index for each sector.

# systems programmers



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# NLRB Blocks Union Bid To Absorb EDP Staff

*(Continued from Page 1)*

"In particular, petitioner did not attempt to bargain for any of these employees during the 1965 contract negotiations," the decision stated.

The union argued, unsuccessfully, that since the job classification of "nonexempt programmers" did not come into existence until October, 1966, it had no knowledge during the 1965 collective bargaining negotiations that EDP personnel were being "improperly" excluded from the unit.

"We find, upon the basis of all the foregoing facts, that both the 'exempt and nonexempt' programmers perform work which has heretofore never been performed by bargaining unit employees; that programmers have performed similar job functions for several years, albeit under different job classifications . . . ," the decision stated. "Considering these factors, along with the differences which exist between programmers and unit employees in regard to job functions, responsibilities, use of initiative and independent judgment, immediate supervision, wages, and hours, we find, based on the entire record, that programmers cannot be regarded as an accretion to the existing clerical unit."

The decision did not mention the petition by the EDP personnel, but the NLRB spokesman said that normally, in cases like this, the opinion of those involved usually is not taken into consideration.

Union officials, negotiating a new contract, could not be reached for comment before *Computerworld* went to press, and company officials have so far declined to say more than what is in the public record.

## [illegible]

A new brochure from IPS describes the types of services available in the buying and selling of used EDP equipment and gives details on the types of equipment handled. Write: Information Processing Systems, Inc., 200 W. 57th St., New York, N.Y. 10019.

An experimental unit that reads stenotype tapes is discussed in a booklet by Scott R. Gilpin and Donald R. Mason called "The Steno Mark Reader: A New Approach to Man-Machine-Man Communication." The booklet may be obtained from Systems Development Division, IBM Corp., Kingston, N.Y.

Literature on the new TR-6708 Tape Reader, which feeds IBM MT/ST cartridges into an IBM 360 computer, is available from Data Corporation, 7500 Old Xenia Pike, Dayton, Ohio 45432.

# *I/O Committee Is Seeking Full Status*

*(Continued from Page 1)*

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# *Terminal Fees to Start at $110 For 'Atars' Reservation System*

LOS ANGELES – The installation and maintenance of a terminal for the proposed Automated Travel Agency Reservation System (Atars) would be $110 a month, Atar Computer Systems Inc. has announced. This charge also would cover the first 1999 reservations made. The charge for each additional 1000 reservations would be $10 a month.

The system [CW, July 31], which would interface with existing airline reservations systems, has been approved by the Air Traffic Conference. Contracts will be submitted to individual airlines this month.

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